

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
29 December 2005 (29.12.2005)

PCT

(10) International Publication Number
WO 2005/124842 A1

(51) International Patent Classification⁷: **H01L 21/268**,
21/20, 21/336, 29/786, H01S 3/00

(21) International Application Number:
PCT/JP2005/011401

(22) International Filing Date: 15 June 2005 (15.06.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2004-180574 18 June 2004 (18.06.2004) JP

(71) Applicant (for all designated States except US): SEMI-
CONDUCTOR ENERGY LABORATORY CO., LTD.
[JP/JP]; 398, Hase, Atsugi-shi, Kanagawa, 2430036 (JP).

(72) Inventors; and

(75) Inventors/Applicants (for US only): TANAKA, Koichiro
[JP/JP]; c/o SEMICONDUCTOR ENERGY LABORA-
TORY CO., LTD., 398, Hase, Atsugi-shi, Kanagawa,
2430036 (JP). YAMAMOTO, Yoshiaki [JP/JP]; c/o
SEMICONDUCTOR ENERGY LABORATORY CO.,
LTD., 398, Hase, Atsugi-shi, Kanagawa, 2430036 (JP).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA,
MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ,
OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL,
SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC,
VN, YU, ZA, ZM, ZW.

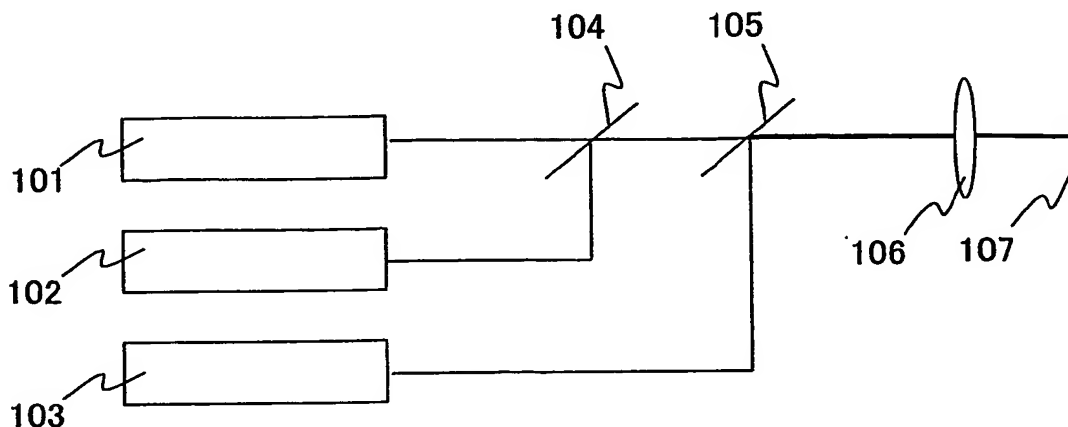
(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO,
SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN,
GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: LASER IRRADIATION METHOD, LASER IRRADIATION APPARATUS, AND METHOD FOR MANUFACTURING SEMICONDUCTOR DEVICE



(57) Abstract: The present invention is to provide a technique that can increase productivity with high output power by combining a plurality of laser beams on an irradiation surface without any difficulties in optical alignment. According to this technique, laser beams having different wavelengths are combined using a plurality of laser oscillators and a dichroic mirror, or additionally a polarizer. For example, a first laser beam emitted from a first laser oscillator is combined with a second laser beam emitted from a second laser oscillator having different wavelength from the first laser beam in such a way that the first laser beam passes through a dichroic mirror and the second laser beam is reflected on the dichroic mirror, and the combined laser beam is projected to an irradiation surface.